into a well borehole, thus the reaction mass and the acoustic actuator are "disposed" in the well borehole.

To restate the argument, the '365 reference does not teach or suggest a method of transmitting a signal from a first location within a well borehole to a second location comprising conveying into the borehole on an elongated member having a longitudinal bore, a reaction mass and an acoustic actuator, the reaction mass being movably disposed on the elongated member and operatively coupled to the acoustic actuator.

As to claim 28, the Examiner asserts that Petersen et al. teaches an actuator (Figure 7, Unit 234) coupled to the reaction mass (Figure 7, unit 232) with a biasing element (figure 7, unit 238). Applicant respectfully requests reconsideration. The element 238 is a rod and there is no biasing element in the figure. Petersen et al. describes pistons within the cylinders 234 that are free to reciprocate in response to some means for controlling the hydraulic fluid within the cylinders. The piston's motion is induced in a rod 238 which in turn moves a reaction mass 232. Applicant submits that redefining "biasing" as used in the present application to cover rod 238 is an overly broad reading of the term, because the rod 238 in merely reacting to the piston's motion and is not itself biasing anything.

Applicant respectfully submits that claim 28 is not anticipated by Petersen et al. for the reasons stated in regard to independent claim 23 and further because Petersen et al. does not teach or suggest a method of biasing a reaction mass.

As to claim 31, the Examiner only states that the actuator disclosed by Petersen et al. is a control device. Claim 31 includes the limitation "controlling fluid flow within the elongated member with the acoustic actuator, the control flow being used to cause the reciprocating movement." The actuator in Petersen et al. is clamped around a pipe, and all hydraulic devices controlling the actuator are thus outside the pipe. Therefore, there is no teaching of the limitation of claim 31. Applicant respectfully submits that dependent claim 31 is allowable over the art of record for the reasons stated in regard to the independent claim 23 and further because the limitation of claim 31 is neither taught or suggested by the art of record.

2 Allow

Rejections Under 35 U.S.C. § 103

Claim 30 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Petersen et al. U.S. Patent 4,314,365.

Claim 30 is a dependent claim having independent claim 23 as a base claim. Applicant respectfully submits that dependent claim 30 is allowable over Petersen et al. for at least the same reasons as for base claim 23. Petersen et al. does not teach or suggest a method of transmitting a signal from a first location within a well borehole to a second location comprising conveying into the borehole on an elongated member having a longitudinal bore, a reaction mass and an acoustic actuator, the reaction mass being movably disposed on the elongated member and operatively coupled to the acoustic actuator.

Furthermore, claim 30 claims oscillating the reaction mass at a resonant frequency. The Examiner's asserts that a wave oscillates best at resonant frequency and thus the claim is obvious to one skilled in the art. Applicant submits that the Examiner's assertion regarding a wave has nothing to do with the claim to oscillating a reaction mass at a resonant frequency.

Claims 1, 2, 5, 9, 11, 13, 14, 18, 21 and 22 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Petersen et al. U.S. Patent 4,314,365 in view of Taniguchi et al. U.S. Patent 5,675,325. Applicant respectfully traverses.

Independent claim 1 is to an acoustic telemetry apparatus for transmitting signals from a first location within a well borehole to a second location. The claim includes the limitation "an actuator coupled to the elongated member and the reaction mass at the first location within the well borehole, the actuator actuated to induce an axial reciprocating movement of reaction mass relative to the elongated tube, whereby the reciprocating movement causes an acoustic wave to transmit into the elongated member, the acoustic wave being indicative of the signal."

The Examiner recognizes that Petersen does not teach an actuator coupled to the elongated member and the reaction mass at the first location within the well borehole. Applicant respectfully submits that the proposed combination or Petersen et al. and Taniguchi et al. still does not teach an actuator coupled to the elongated member and the

reaction mass at the first location within the well borehole.

The Examiner's assertion that the teaching in Taniguchi et al. of an acoustic transmitter positioned within a well borehole does not provide any suggestion or motivation to modify the apparatus of Petersen et al. Furthermore, the combination is improper, because Taniguchi et al. teaches away from the concept of inducing an acoustic wave in a tube body using a biased oscillating stack coupled to the tube.

Taniguchi et al. describes ceramic transducers as shown in FIG. 2 were reference numeral 7 means ceramics crystals in which crystals are stacked side by side, and FIG. 3 is a sectional view of the oscillator 1 shown in FIG. 1, in which reference numeral 8 means an elastic body such as spring, and 9 is a coupling portion to combine the oscillator 1 with the tube body. The oscillator 1 is disposed in a recess provided in the tube body, and one end thereof, i.e., the coupling portion 9 is pressed in contact with a lateral surface of the drill string to provide bias force to the stack of the ceramic crystals 7 such that vibration of the oscillator 1 can be coupled by the elastic body 8 into the tube body. See column 1, lines 50-61.

Taniguchi et al. states at column 3 lines 12-26 that, energy transmission of the acoustic signals from the piezoelectric ceramics to the tube body depends upon vibration combination through the coupling portion 9. Thus, the energy transmission is limited, and energy generated from the piezoelectric ceramics can not efficiently be transmitted to the tube body. The piezoelectric ceramics can provide extremely poor energy transmission efficiency of one percent or less. Therefore, it is necessary to ensure a large vibrator for outputting tremendous energy and a large power source according thereto such that the piezoelectric ceramics can excite and transmit the carrier waves to the tube body. However, there is a further problem in that it is very difficult to ensure the large vibrator and the large power source according thereto because of the thin drill pipe 5 as described above.

Taniguch et al. proposes overcoming the perceived problems of ceramic oscillators by using an exciting current is fed to a magnetostrictive device depending upon the underground information to generate the elastic wave. Concurrently, the elastic wave causes resonance of the resonance tube body, and the resonance vibration generates the

elastic wave having the frequency inherent in the resonance tube body to propagate the elastic wave through the drill string. This can eliminate the need for the coupling combination for a modulating carrier wave, required to employ conventional piezoelectric ceramics. As a result, there are effects of enhanced transmission efficiency of the underground information through the tube body, and of further extension of a transmission distance. See column 12, lines 41-53.

Applicant respectfully submits that the combination of Petersen et al. and Taniguchi et al. as proposed by the Examiner is not proper because Taniguchi et al. teaches away from transferring energy from an oscillating member to an elongated tube as required by Petersen et al. Consequently, Applicant respectfully submits that independent claim 1 is not obvious over the proposed combination.

Rejected claims 2, 5, 9, 11, 13, 14, 18, 21 and 22 all have independent claim 1 as a base claim. Thus, these claims include all of the limitations as recited in claim 1. Applicant respectfully submits that claims 2, 5, 9, 11, 13, 14, 18, 21 and 22 are allowable over the proposed combination for at least the same reasons as stated above for independent claim 1.

Conclusion

For all the foregoing reasons Applicant submits that the application is in a condition for allowance. The Commissioner is hereby authorized to charge any fee due for this response or credit any overpayment to **Deposit Account No. 02-0429 (414-12346-USCP)**.

Respectfully submitted,

Date: June 28, 2004

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